

Aircraft Safety

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LEARNING OBJECTIVES

Upon completion of this session, the reader will be able to:

- Discuss the safety considerations of packing deployment gear for air travel.
- Discuss safety considerations in using commercial and military aircraft as a means of travel.
- Discuss the process of going through US Customs when traveling to and from disaster sites located outside the United States.
- Discuss the safe loading and unloading of patients onto both fixed and rotary winged aircraft.
- Discuss the procedures to prepare a safe landing zone for rotary wing aircraft.

INTRODUCTION

The storm hits, a federal disaster is declared, and you receive the call from NDMS that your DMAT is to be deployed. All the planning, training, and dreaming are about to become a reality, but one question remains: "How will we get there?" As the DMAT members are preparing their personal supplies and anticipating needs, the team commander calls and states that the team is to fly to the disaster site. Bags must then be packed properly for airplane transport. This lesson will discuss preparation of personal gear, boarding procedures, and in-flight considerations for both commercial and military aircraft. Included is a review of general aircraft safety regarding passenger considerations, working around aircraft, loading patients onto both fixed and rotary aircraft, and preparing a safe landing zone for rotary winged aircraft (helicopters).

COMMERCIAL AIRCRAFT

Aircraft safety begins at home! DMATs must pack their personal gear carefully so that the items necessary for the mission can be transported safely. If personal gear is not packed in accordance with the guidelines published by airlines and the Federal Aviation Administration (FAA), it could start an in-flight fire, release noxious gasses into the airplane, or even cause an explosion.

The first step is to find out as much as possible about the proposed mission and therefore about the specific gear that will be needed. For instance, the gear needed to provide medical staff support in an existing facility, with team members staying in a hotel, will be different from the gear needed to set up a tent facility in the midst of the disaster area. Sufficient planning is warranted for changes in mission assignment: missions can change even while a team is traveling to a site.

When traveling on deployment, we recommend that each team member prepare a carry-on bag as well as a main gear pack that will be checked at the airport and stored in the aircraft baggage compartment. Personal gear should be kept as light as possible. A team member must not pack more than he or she can willingly carry. DMAT guidelines and most domestic commercial airlines set a limit of 70 pounds of luggage. The specific airline's limitations on weight, number, and size limitations of baggage should be checked. Most airlines will accept a maximum of three baggage items free of charge (including carry-on) for a ticketed passenger. Size limitations (length + height + width) for Delta Airlines are as follows: first bag, 62"; second bag, 55"; third bag, 45". Baggage in excess of 100 pounds must be shipped as air cargo.¹

Carry-On Luggage

The carry-on bag should contain a flashlight; a change of underwear; socks; food, snacks, and drinking water to last for the first 24 hours; and personal items such as eyeglasses, contacts lenses, medications, and personal care items. This bag should remain with the team member at all times. If the main gear is delayed or misplaced, the carry-on bag can sustain the person for a short time. Please refer to the Personal Gear session of this training program for a list of carry-on and check-on gear. The carry-on bag must be screened by airport security, so it should not contain items that can be used as weapons, e.g., large knives, mace, pepper spray, alcohol, or firearms. Federal regulations require that, if firearms are being transported, they must be in checked baggage and declared when the bags are checked.⁴ (Since DMAT members are forbidden to take firearms on deployment, this should not be a problem.) The carry-on piece should fit under an airplane seat or in an overhead bin. Since there is no federal regulation limiting the size of carry-on luggage, each airline has different size restrictions. Delta Airlines requires the carry-on to fit in a "Size Wise" unit, approximately 22"x14"x 9".²

Personal electronic devices may interfere with the airplane's electronic control and navigational instruments and may not be used during a flight. Airlines ^{1,2} have published information concerning the use of personal electronic devices:

In an aircraft, the following electronic devices **may not be operated**:

- Cellular phones - except while the aircraft is at the gate
- Two-way transmitters such as walkie-talkies, amateur radios, citizen band (CB) radio transmitters
- Devices designed to radiate radio frequency energy on specific frequencies
- Peripheral devices for computers or games connected by cable
- AM/FM radios
- Portable television sets
- Remote control toys

The following devices may **NOT** be operated when the aircraft is at the gate or in taxi, takeoff, initial approach, or landing phases¹:

- Personal computers
- Personal computer peripheral devices
- Personal computer games
- VHF scanner receivers
- Compact disk players
- Digital cassette tape player/recorders
- Video recorder/playback systems
- Calculators
- Global positioning satellite (GPS) systems

The following devices may be operated at any time:

- Hearing aids
- Heart pacemakers and other implanted medical devices
- Electronic watches
- Electronic nerve stimulators
- Electric shavers

- Airline-installed equipment
- Acceptable personal life support systems and personal pagers

Due to safety concerns, flight crew personnel may ask a passenger to turn off a personal electronic device at any time.¹

Identification of Luggage

The team member's name, address, and contact information should be placed on both the inside and outside of carry-on and checked luggage. This labeling will help retrieve luggage that is misplaced or otherwise separated its owner.³ It is a good practice to mark luggage so that it is easily recognizable, in case other passengers have used similar baggage

Checked Luggage

The main gear bag is usually a duffel bag or backpack. It should be easy to carry. (Some DMATS discourage the use of hard suitcase-type luggage because it is difficult to stack.) This bag contains the clothes, sleeping bags, and personal items the DMAT member will use on deployment. This baggage will be checked at the airport (left at the ticket counter and stored in the baggage compartment of the plane). The bag must not contain hazardous or potentially hazardous materials that might cause a fire, chemical leak, or explosion while in flight.¹ Examples of such items are listed below:

- Acids, chlorine bleach
- Lighter fluids, butane lighters
- Matches - especially white-tipped, strike-any-where matches
- Propane or compressed gas canisters used with camp or backpacker's stoves
- Flammable liquids and solids
- Corrosive, flammable, explosive, oxidizing liquids, poisons, or radioactive materials
- Personal protective sprays such as mace, pepper spray, pressurized insecticides

When packing personal gear, realize that baggage compartments are not always pressurized or air-conditioned. In addition, baggage may be handled roughly, dropped, turned upside down, compressed, shifted and/or opened during handling, loading, and flight. Items that would not normally be hazardous can cause real problems when spilled; mixed with other chemicals; and released in an enclosed, hot, pressurized compartment.

DMAT personnel should pack their own luggage and must not accept packages or baggage from others, especially strangers. Luggage must not be left unattended. This provides an opportunity for belongings to be stolen or for someone to use a passenger to smuggle contraband materials onto the plane. Checked baggage should be locked to provide an extra layer of security. More information on security tips regarding air travel and checked luggage security is available at the Harrison Luggage Web site:

<http://harrisonluggage.com/security.htm>.⁴

Travel To The Airport

Airline passengers should arrive at the airport early. Most airlines request that ticket holders arrive at least 1 hour before domestic flights and 1 1/2 hours before international flights.⁵ Since DMAT deployments are not planned far in advance, team members usually do not have their airplane tickets prior to arrival at the airport. For large group deployments, a designated team leader can be sent a copy of the travel orders, listing the names of team members who are to have tickets awaiting them at the airport. These tickets must be picked up at the airline ticket desk. The team leader oversees the process and assists each member in obtaining his/her ticket. Federal law requires photo identification of anyone boarding a commercial flight. An NDMS ID badge will suffice as photo ID. All team members must identify themselves, check their baggage, and pass through security posts. This process consumes a large amount of time, so team members should meet at the airport at least 2 or 3 hours prior to flight departure.

Electronic Tickets

More airlines are now issuing electronic tickets. Travel itineraries for these tickets are usually sent to the passenger via e-mail or fax transmission when the reservations are made. Upon arrival at the airport, the passenger presents the itinerary and personal identification to the airline officials. Only then will a boarding pass for the assigned flight be issued. If the electronic ticket holder does not plan to check any luggage, he or she may proceed to the service counter at the flight gate and obtain the boarding pass there.

Pre-Deployment Preparation

During the fast-paced events of a deployment, one of the greatest safety precautions is for the DMAT member to be mentally and physically prepared for the flight. For mental preparation, having a deployment plan and checklist will reduce the amount of time and stress prior to leaving for the airport. For physical preparation, deployment gear can be pre-packed and ready for aircraft transport. The better

prepared a team member is prior to the deployment call, the safer he or she will be when preparing gear, completing last-minute errands, and safely driving to the airport. Team members should familiarize themselves with the safety information provided by the airlines, including listening carefully to the safety briefing provided by the flight attendants.⁵

US Customs

Even though DMATs are not usually deployed to international disasters, they have responded to natural disasters and airline crashes outside of the continental United States. Returning travelers are required to fill out a Customs Form. Customs Form 6059B (013194), requires everyone entering the United States to state their name, address, and country of citizenship; list the countries visited while on the present trip; and answer questions about food, plants, money, and the value of merchandise being brought into the United States. The reverse side lists the rules and regulations on items that must be declared. At the Custom's check point, each passenger must show proof of citizenship. The US passport, the preferred form of ID, is required for international travel. However, for travel to and from US territories, Caribbean Islands, Mexico, and Canada, proof of citizenship in other forms is acceptable. The most common documents are birth certificates, voter's registration cards, and photo IDs. A driver's license and a federal DMAT ID card will usually suffice. At this time, each passenger must identify all of his or her luggage and escort it through the Customs inspection area. The Customs officers may inspect luggage at random. Any suspicious piece of luggage may be searched thoroughly by x-ray, detection animals, or manual procedures. The Customs Declaration will be compared with the contents of the luggage being searched.⁶

MILITARY AIRCRAFT

When preparing to deploy on a military aircraft, follow the same packing instructions as for commercial flights. The same baggage safety rules apply, however, some additional guidelines and safety rules need to be considered.

When airlifting a DMAT, the military will probably use either a C-130 or C-141 cargo plane. These planes are very adaptable and use multiple configurations to meet the mission needs. They have a rear gate that converts to a ramp, allowing trucks or other vehicles access inside the plane. A C-130 is large enough to seat a 35-member team and accommodate three pallets of medical and other supplies. To make

the best use of the space, the team members sit in webbed seats placed in rows facing each other in the front third of the aircraft. The space is limited, and the under-seat storage space is very small.

Carry-On Luggage

On military aircraft, gear bags are usually packed on a pallet and covered with a tarpaulin and cargo net. Team members probably will not be reunited with their gear until they arrive at the final destination. After being unloaded from the aircraft, baggage might be lifted onto a truck and could remain there for a day or two. For this reason, team members are encouraged to pack their carry-on bag as described earlier. This bag must be small enough to fit under the seat of the aircraft. There is no overhead storage on most military aircraft. It is imperative that all carry-on luggage be stowed securely so that it will not become a projectile in the event of turbulence or other sudden movements. There is no cabin service on military aircraft, so team members should carry snacks and drinks either in their carry-on luggage or their pockets.

Hearing Protection

The C-130 and C-141 aircraft are not usually insulated and have several very powerful engines, generating a high level of noise. When working around these aircraft or while flying as a passenger, the DMAT member needs to use some method of ear protection. According to the US Air Force, two types of personal ear protection devices can be used to reduce exposure to hazardous or undesirable noise: insert devices (ear plugs) and occluding devices (headsets or muffs). Insert-type ear plugs range from wads of dry cotton to plugs of dental acrylic or other plastic, molded to fit the individual's ears. Occluding ear protection comes in different noise-reducing levels and different types. Some muffs are equipped with earphones as well as a noise-canceling microphone. These communication-type muffs are used primarily by ground crew personnel during engine run up and checkout operations but are rarely used by passengers.⁷ Disposable sponge earplugs that expand to fit all ear sizes are carried on the aircraft and will be issued to all passengers prior to the flight.

Safety Briefings

The aircraft crew will conduct a preflight safety briefing. Since the C-130 and C141 are so noisy, the safety briefing may be conducted in the assembly area, hanger, or airport terminal before the team boards the plane. These briefings will cover safe enplaning procedures, use of hearing protection, standard

flight expectations, emergency procedures, and any other information the flight crew thinks is needed to complete the mission safely.⁷

Boarding the Airplane

After the pre-flight briefing is completed and the cargo is loaded, passengers will board. A crew member will direct passengers to the aircraft. Since the team is flying on a cargo plane, and usually from a military airfield, passengers will be driven to the plane's location or will walk from a location near the airfield.

The following guidelines apply to passengers boarding military aircraft:

- The flight crew has the right to search each passenger and his or her baggage to make sure they are safe to travel.
- A passenger manifest will be completed prior to beginning the flight. This will include each passenger's name, birth date, and social security number.
- There is a "circle of safety" zone around the aircraft, which vehicles or people must not enter unless directed by the flight crew. This circle extends 10 feet from the nose, wings, and tail of the aircraft.
- All vehicles moving within the 10-foot "circle of safety" must use a spotter, and wheel chocks must be used when the vehicle is parked.
- All vehicles must approach and be parked by the airplane with the driver's side toward the aircraft. Only one vehicle at a time is allowed to be in motion within the circle of safety.
- No smoking is allowed within 50 feet of the aircraft.
- All passengers are to stay together in a group when on the flight line near the aircraft. The leader of the group will be a member of the flight crew. Passengers are not to approach the aircraft until directed to do so by the flight crew.
- Do not walk under the wings or propellers, even if the plane's motors are not running.
- Do not run when approaching the aircraft. Walk slowly in a single-file line, approaching from the front of the plane to the entry door, usually on the front left side of the plane, just behind the cockpit (or other entrance, if directed to do so).
- Wear hearing and eye protection (safety glasses/goggles) when approaching the plane if the engines are running.

- Everyone entering the aircraft must have one hand free to hold the rail as they walk up the stairs. If someone has too much to carry, another able-bodied, empty-handed member of the group may be asked to carry part of the load.
- Upon boarding the aircraft, find your seat and securely stow your carry-on luggage under the seat.
- When boarding the aircraft at night or in a very dark environment, it is permissible to use flashlights; however, do not point the lights in the face of the flight crew members and do not direct the lights toward the cockpit. This will disrupt the crew's night vision, which will take at least 30 minutes to return to optimal levels.
- During flight, use low lights or flashlights with red or blue filters.
- As with commercial flights, the aircraft will not depart until everyone is seated with seat belts fastened and all carry-on luggage, equipment, and loose items are stowed securely.
- Long-sleeved attire should be worn by all persons working around the aircraft, especially when the engines are running, to help guard against flying debris. Also, since the airplanes are not usually insulated, long-sleeved attire will add to comfort in higher altitudes, where the temperatures are colder.
- Work or protective gloves should be worn when loading equipment, supplies, and/or littered patients onto the aircraft.
- For safety reasons, rings should not be worn when working around the aircraft.
- When flying on military aircraft, dog tags, if available, should be worn by all crew members and passengers.
- All passengers are to remain seated and wearing seat belts while the aircraft is taxiing, taking off, and landing and anytime the "Fasten Seatbelt" indicator is active. When allowed to do so, passengers may be out of their seats during the flight. However, for safety, they should remain in their seats with their seat belts fastened in the event of unexpected turbulence or aircraft movement.
- The webbed seats do not have headrests. Head support for sleeping while en route can be obtained by joining several bandanas, looping them through the webbing, and slipping them over the forehead.

- Latrines or urinals are available during flight; however, they are minimal, so all passengers should use the restroom prior to boarding the plane.
- No smoking or alcohol consumption is allowed during flight.
- Upon landing, passengers should remain seated, with their seatbelts fastened, and follow the directions of aircraft crew for deplaning procedures. When given clearance to move in the cabin, team members should carefully collect all belongings and carefully exit the plane.
- Upon leaving the aircraft, team members should resume a single-file line and depart at a 45-degree angle from the aircraft, away from the wings. Proceed as directed to a designated area by the flight line and/or to an awaiting bus.
- The flight crew and airport staff will off-load the cargo pallets.⁷

Further information regarding deploying on the C-130, C-141, or other military aircraft is available from the Headquarters Air Mobility Command, Scott Air Force Base, Illinois 62225.

Rotary Winged Aircraft

Occasionally DMAT members are deployed to a scene or transported around disaster areas, or they air lift patients, on rotary winged aircraft (helicopters). Each disaster situation is different, and each mission may have a different helicopter type. During the NDMS response to Hurricane Andrew in Miami, Florida, many types of helicopters responded to DMAT treatment centers to transport patients, supplies, and food. It was not unusual to have a small Bell Ranger arrive to transport a patient from the disaster area and then have a Huey UH1, Blackhawk, or a twin rotary blade Chinook respond on subsequent missions.

Working around rotary winged aircraft can be very dangerous. There are two major danger areas near the aircraft: the area covered by the sweep of the main rotor blades (the "rotor disk") and the tail rotor area. Any movement under the rotor disk must be made with caution. The rotation of the blades can be lethal. In some situations, the clearance between the blades and the ground is reduced enough that anyone standing within their reach might be struck. Also, the rotor blades produce wind gusts that can cause injury from flying debris and even blow people down. The terrain on which the helicopter has landed is also a safety issue: Approaching a helicopter from upslope will place a person much closer to the rotor disc than approaching from the downslope side. The tail rotor is very difficult to see because of its high rate of spin. Since the tail rotor's clearance is sometimes less than head high, it produces an invisible hazard, so any

movement past the rear cargo doors of the aircraft is forbidden. Other hazards in the tailboom area of the helicopter are the engine exhaust, radio antennas, and the elevators (cross wings) of the aircraft.^{8,9}

When working in and around rotary winged aircraft, basic rules apply:

- The weight restrictions for passengers and gear on rotary winged aircraft are very strict. (Different types and sizes of aircraft have different guidelines.) DMAT members may have to limit the amount of supplies and gear being transported.
- Rotary winged aircraft have high noise levels. Passengers must use hearing protection.
- Footing during boarding and exiting the aircraft may be very unstable. Ankle supporting boots such as combat boots are essential safety equipment.
- Eye protection (e.g., goggles, safety glasses, face shields) is essential when working around landing zones and approaching aircraft with turning blades.
- Do not approach the aircraft until directed to by the pilot or flight crew.
- When approaching an aircraft with turning blades, the following rules must be followed:
- Approach only from the front or between the 9 o'clock and 3 o'clock positions, with the nose of the aircraft being the 12 o'clock position, and only after making eye contact with the pilot or his/her designate and receiving a verbal or hand signal to approach.
- Stay clear of the tail rotor area. When the blades are turning, they can become nearly invisible and very dangerous to distracted workers.
- Secure all loose items, clothing, bedding, supplies, or anything that may be picked up by the blades and either damage the aircraft or become dangerous projectiles.
- Keep your head low when near or under the rotating blades. Hats or caps should not be worn since they can be blown off the head and become a projectile.
- Do not hold anything above your head (such as IV bags), since this greatly reduces the distance from your body to the rotor disk.
- No smoking or open flames near the aircraft or landing zones.
- Some missions are flown with the aircraft doors open. Secure all loose objects to keep them from falling out of the aircraft.

- Wear the safety belts and/or harnesses provided in the aircraft. The aircraft crew will instruct you on the proper use of the safety restraints.^{8,11}

Communications in High-Noise Environments

When working in high-noise environments, effective verbal communication is impossible. Headsets with noise-canceling microphones are used by aircraft crew members, especially in fixed winged aircraft. The headsets are normally attached to the aircraft by a long wire cable. However, in rotary winged aircraft, due to the danger of the loose items being suctioned into the rotary blades, the use of an extended cable outside the aircraft is not allowed when the blades are in motion. Two-way radio headset communication devices are sometimes used. The number of wireless radio transmitters is limited and not everyone working in and around the aircraft will have access to such a device. As a result, the best way to communicate with the aircraft crew and other workers in the high-noise environment is to use hand signals. When approaching the aircraft, one must not proceed until directed to do so by the flight crew.⁸⁻¹¹

Landing Zones

Setting up a DMAT encampment requires many decisions regarding site selection. One factor that requires much consideration and preparation is the landing zone (LZ) for the helicopters that will be used to transport patients, supplies, and/or disaster relief personnel. A site for a LZ must be selected carefully to ensure it is in a useful location but not too close to the DMAT campsite. Other safety considerations also must be addressed.

Landing Zone (LZ) Site Location and Preparation

The LZ must be close enough to the DMAT encampment to allow easy access, but far enough away so that the wind currents caused by the aircraft's rotor blades (rotorwash) do not disrupt the camp by blowing down tents or equipment or causing injuries from the flying debris. The larger the aircraft, the more rotorwash they produce.

The LZ should be at least 200 feet from the camp. The area should be easily accessible by foot and vehicular traffic but located in an area that will not restrict the main traffic flow into and out of the DMAT camp.

The following are basic guidelines to follow when choosing and setting up a landing zone:

- Size: Ideally, the landing zone should be at least 100' x 100'. Some smaller aircraft can land in an area 60' x 60' (during the day) but prefer at least 100' x 100' at night if possible. Larger military aircraft require at least a 100' x 100' landing pad.
- The LZ should be on a flat, firm surface, free of overhead wires, poles, trees, and structures.
- Grass on the LZ should be less than 12 inches high, and it should be cut if it is higher. Starting at the center of the LZ, the whole area should be searched carefully and cleared of debris, small objects, and trash that could be suctioned into the rotor wash and damage the aircraft or become a projectile that would injure bystanders on the ground.
- The landing zone can be marked on all corners to enable the pilot to identify it easily. During the day, orange traffic cones or brightly colored flags can be used to mark the corners of the LZ.
- If the LZ is on a paved surface, the area can be identified using paint. If using paint, mark the four corners of the LZ, and if possible, mark the perimeter using at least a 4-inch stripe of brightly colored paint. If you mark the center of the LZ, paint a large "H" to mark the spot. Do not use an "X" because that is the symbol used by the FAA to designate that the landing zone or runway is closed or is unsafe to use.
- At night, use yellow or orange lights or strobe lights to mark the perimeter of the LZ. Yellow or orange is preferred because red usually indicates an obstruction. Each corner is marked with one light, and the center of the upwind side is marked with a fifth light. Flashlights with traffic directional cones attached can also be used to mark the LZ. Commercial kits designed to use as temporary markers are also available (EMTech International). Some recommend marking the entrance corridor of the LZ with a white or clear light. However, caution should be used to keep bright white lights, searchlights, and automobile headlights away from the LZ because they can impair the pilot's night vision. Do not use flares to mark the LZ. Flares are a major fire and safety hazard when used around rotary winged aircraft.
- If you are not able to locate the LZ in an open area, try to find an area in which obstacles such as trees, power poles, and buildings any higher than 50 feet tall are at least 100 feet away from the perimeter of the LZ. When communicating with the aircraft pilot by phone or radio, describe any

obstacles and other potential obstruction information using compass directions of north, south, east, or west from the center of the LZ.

- Inform the flight crew of any wires within 300' of the landing zone. Advise the crew of the location and height of the wires. Inspect the landing zone closely, especially at night. Small phone lines and stabilizing wires are hard to see in the dark.
- If the landing zone is not acceptable to the pilot, he will assist you in locating another location.
- It may not be suitable to fly in certain conditions such as fog, freezing rain, snow, or thunderstorms. The aircraft may not be able to complete the mission if the weather changes or if the LZ is located near a body of water and ground fog is present.
- Helicopter pilots usually land and take off into the direction of the wind. Try to keep the approach and exit corridors in line with the prevailing winds when possible. Also try to locate the LZ where these corridors do not have the aircraft flying directly above the DMAT encampment.
- Helicopters generate very high winds ("rotorwash"). Keep all personnel and bystanders away from the LZ during landing and take-off. The winds generated by some aircraft can exceed 75 MPH. In winter, this rotorwash can produce extremely low wind chill factors. Anyone working in or near the LZ should have all skin surfaces protected and should wear eye protection.
- Ground crews should use eye and hearing protection when working in or near the LZ. Chinstraps should be used to prevent helmets and hats from being suctioned into the rotor blades.
- It is acceptable to moisten dry dirt or sand prior to a helicopter's arrival to prevent blowing debris.
- A spotter serving as a landing zone coordinator should be positioned 50 feet in front of the desired landing spot. The pilot will follow the spotter's hand signals and directions when approaching the LZ. (See hand signal chart.) Many pilots never look at hand signals but readily accept a "wave off." Upon landing, pilots generally like to position the aircraft so they can see the scene or the area from which the patients will be loaded. Wind and landing zone factors sometimes do not allow this. The pilot may turn the aircraft sideways to better view the terrain and blow down tall grass in the area where the crew will exit the aircraft.

- Keep everyone away from the LZ and do not approach the aircraft without approval from the pilot. Remember to keep heads low when under the rotor disc area when approaching and exiting the aircraft.
- Do not radio the aircraft during the last 30 seconds before landing, except to report an immediate hazard. If you identify a potential hazard, send a "STOP" or "ABORT LANDING" radio transmission.¹⁰

We usually recommend that the radio operator wear ear muff type hearing protection and slip an earphone under, as it provides protection and better communications. DMATs won't always be able to talk with the inbound aircraft - especially the military helicopters, since they tend to have a radio frequency of their own.

Notifying the Federal Aviation Administration (FAA)

When problems arise which might affect air space, navigational aids, or traffic flow, the FAA will issue a report called a Notice to Airmen (NOTAM).^{8,9} These advisories notify pilots of known problems in an area and list temporary restrictions, hazards, or changes in the space. After most major disasters, the FAA usually restricts the air space above the site to control the amount of unnecessary aircraft traffic over it. This keeps "sight-seeing aircraft" out of the space, providing a safer, less congested area in which disaster response aircraft can complete their missions.

The FAA will also list airstrips and/or helipads within the area that are temporarily out of service or unusable. If DMATs are assigned to an area with an existing helipad or airstrip that has been rendered unusable due to obstructions such as fallen trees, downed power lines, or debris or if the landing area is unstable, eroded, and for any reason will not support the weight of the aircraft, the FAA requests that it be notified. Also, if a temporary landing zone needs to be established at a DMAT site or anywhere in the area that DMATs will be assigned, the FAA requests that it be notified. This is important to make sure that the landing zones are not located in an area of potential danger, so that disaster response aircraft are not sent into restricted areas, airport traffic areas, approach paths, and other high-use airways. The FAA requests that, before a landing pad is established, unless it is an extreme emergency, that the agency be notified in writing using FAA Form 7480-1, the Notice of Landing Area Proposal. This form is used for requesting a site and for ensuring there are no unseen problems that might prevent the safe operation of aircraft in the

proposed area. Several FAA regional offices are listed on the form. The form should be faxed and a telephone call placed to the FAA office to expedite the process of landing zone selection and approval. The form requests information regarding the purpose, location, layout, proximity to other landing zones, and obstructions or potential safety related considerations that are pertinent to the FAA and pilots. Once approved, the new landing zone will be listed in the NOTAMS so that other pilots working in the disaster area will be aware of the safe landing area, should they have an emergency near that location. The report should be filed by the Management Support Unit with the DMAT's assistance.

PATIENT LOADING/UNLOADING ONTO AIRCRAFT

Patients are frequently evacuated from the disaster site using aircraft. The evacuation may be a single person needing to be sent to an established medical center for definitive treatment or a large group of persons who are being evacuated from an unsafe area or who are victims of a mass casualty incident. DMAT members may initiate the transfer of patients by calling the MST or other established connections to arrange the airlift. Once the request has been made, controlling authorities will assign an aircraft to the mission. Since it would be impossible to describe in detail loading and unloading procedures for all the different types of aircraft, general guidelines for loading patients in rotary and fixed winged aircraft are discussed in this section.

Rotary Winged Aircraft

Rotary winged aircraft are the primary type of aircraft used to airlift patients from the DMAT's area of operations. DMAT members should follow the basic rules discussed in the aircraft safety section of this training program when setting up landing zones and when approaching and working in the immediate area of any rotary winged aircraft. The most important rule states that no one is to approach the aircraft until directed to do so by the pilot or a designated crew member. A few basic rules that apply to most situations when loading patients onto rotary winged aircraft are listed below:

- Eliminate unnecessary personnel and spectators from the landing zone area.
- Do not drive vehicles through the landing zone. If the patients are in motorized vehicles (ambulances, buses, or trucks), keep them parked away from the landing zone until the aircraft is safely on the ground. The aircraft crew will give directions where to best locate the vehicles to facilitate the loading process.

- In most cases, the flight crew will leave the aircraft and go to the patient to assess and prepare him or her for the airlift.
- Especially in commercial aircraft, the patient may need to be moved from the litter or stretcher to one designed especially for the aircraft being used. This transfer will need to be done in a safe area away from the aircraft, if at all possible. Most military aircraft are configured to use the standard folding litter.
- Patients and care providers should be briefed on the planned evacuation, loading plans, and what to expect.
- Prepare the patients by
 - Securing them to the litters using straps.
 - Securing loose objects such as sheets, blankets, medical supplies, oxygen tubing, and clothing so they will not get suctioned into the aircraft's rotor blades especially, during "hot" loading or unloading. ("Hot" means the aircraft engines are running and the rotor blades are turning.)
 - If at all possible, use plastic IV bags instead of glass IV bottles. Secure the IV bags and tubing so they will not get caught and pulled out during the transport.
 - Secure all adjunct medical equipment (oxygen tanks and tubing, splints, backboard straps, etc.).
 - Provide eye and ear protection for the patients, especially when performing a hot load. The patient's eyes can be covered with a blanket if no other protection is available.
- The loading crew also must remove or secure loose clothing and objects before approaching the aircraft. Hats, caps, and lab coats can become deadly projectiles or damage the aircraft if they are suctioned into the rotorwash.
- When carrying the littered patient toward the aircraft, use a four-man carry. Orient the patient in the position in which he or she will be placed into the aircraft, either head first or feet first. Some military units use a device called the NATO litter cart, designed to carry one littered patient. The cart can be moved by one person, but the transport is safer with two. The litter is easily released from the cart just prior to lifting the patient into the aircraft.

- When approaching the rotor disc area, KEEP YOUR HEAD LOW! A sudden unexpected gust of wind or aircraft movement might cause the blades to dip lower. A rotor blade strike is almost always fatal.
- The flight crew will direct all movement of the loading team; follow their instructions very carefully. Patients are normally loaded from the top tier down to the bottom tier.
- When loading multiple patients into a helicopter, the most seriously injured patients are usually loaded last on the bottom pans of the litter support unit.
- The loading crew hands the litter to aircraft crew members inside the aircraft by lifting the litter and slowly passing it to the flight crew, who will secure it into the litter support system. Follow their instruction for proper placement of the littered patient.
- In larger aircraft like the Black Hawk and Chinook, patients may be loaded from both sides of the aircraft. The same loading procedures apply. DMAT members should follow the crew members' directions. The Chinook has the capacity for 24 litter patients or 31 ambulatory patients. The patients may be loaded using the rear door of the aircraft, which folds down to form a ramp, similar to the one on the C-130 airplane.
- When loading multiple patients, loading personnel should leave the aircraft as a unit to obtain another patient. This minimizes confusion and decreases the chance of injuries caused by too many people moving in different directions around the aircraft.⁸⁻¹⁶
- To prevent blood from backing up into an IV while the bag is held low during loading, the roller clamp may be adjusted to closed or nearly closed. The flow rate may be readjusted once the patient is onboard the aircraft. This will also prevent the introduction of air into the IV line, as often occurs with blood tubing during this procedure.
- During the loading process, it is easy to accidentally dislodge invasive equipment such as endotracheal tubes. During the loading process, ambu bags should be disconnected from the endotracheal tube and reconnected once the patient is onboard and under the care of the flight crew. Be sure to hyperventilate the patient prior to this maneuver.
- Because it is nearly impossible to communicate under the rotor disk and near the engines, loading team members should set their plan of action before approaching a helicopter for a hot load.

Ambulatory Patients

Ambulatory patients are loaded after those in litters, because of the limited space inside the aircraft. They will be escorted to the aircraft, assisted into their seats, and secured in their seatbelts. Ambulatory patients should be briefed on the expected procedures, checked for loose clothing and objects, and provided with appropriate eye and ear protection.

Each patient should be escorted to the aircraft by an assistant. Follow the flight crew's directions as to when and how many ambulatory patients may approach at one time. All paperwork, medical records, transfer forms, and ID and tacking tags should be completed and securely attached to the patient and/or litter prior to approaching the aircraft.¹⁷

Unloading the Rotary Winged Aircraft

The aircraft is unloaded in the reverse order of the loading procedures. The tiered litters are unloaded from the bottom to the top on one side, then on the other side. At the unloading command, the litter squad moves to the helicopter and the bearers take their proper places at the litter. The same safety rules apply as when loading the aircraft.¹⁷

Loading Patients onto Fixed Winged Aircraft

In the response to mass casualty incidents and disasters, fixed winged aircraft might be used to evacuate a large number of patients from the site. The most common aircraft used by the military for this purpose are the C-130 and the C-141. However, other types of aircraft are adapted and used to transport patients. When approaching and working around these aircraft, the previously discussed safety rules for rotary aircraft also apply. The airplane props (propellers) are the most dangerous area of the airplane. Stay clear of the props even if the engines are not running.

When loading a large number of patients and/or passengers into a fixed wing aircraft, the following guidelines are usually followed:

- Ambulatory patients are loaded first. Before the loading begins, the aircraft crew members will brief the patients and the DMAT members assisting with the procedure. The patients usually enter the aircraft using the steps or a ramp at the crew/passenger doors near the front of the aircraft. US Air Force policy states that patients must enter the plane in a line led by an aircraft crew member, who guides and sets the pace of the ambulatory load. As the ambulatory patients move to the aircraft,

they are to put their left hand, if unaffected by injury, on the shoulder of the person in front of them. Another crew member follows the line to observe the whole loading process. This person ensures that the back of the line does not drift into a dangerous area, such as near the props, and monitors for any passengers who need further assistance.⁷ A DMAT responsibility, when directed by the aircraft crew, might be to help ambulatory patients into the aircraft, providing physical support as needed. The flight crew is responsible for seeing that passengers are in their seats with seat belt or other restraints fastened securely. Their luggage and other carry-on items will be stored securely. All patients should use the latrine prior to entering the plane, since facilities on the plane are quite limited.⁷

- Non-ambulatory and litter patients will usually be staged in a holding area near the airfield. DMAT members assisting with this operation should prepare patients for the loading by completing the following steps:
- Stabilize and treat all life-threatening problems.
- Triage all patients to be loaded. The most critical patients are the last to enter the aircraft and the first to deplane once they arrive at their destination.
- Complete all medical records, orders, and transfer paperwork. The military usually uses a tracking form called the DOD-602. This is an oversize tag that attaches to the patient and contains basic information such as medical conditions/injuries and in-flight medical orders and includes space for in-flight documentation.
- Assist all patients in using the latrine. Empty all fluid collection bags and stow them securely in the patient's litter. Secure all bed linens using litter straps and/or tape as needed. Secure, recheck and regulate IV bags to the proper flow rate.
- Provide eye and ear protection, if available, to patients prior to entering the aircraft. Especially during a "hot" load, if the patients are unresponsive, cover their eyes with a blanket or a cravat. If the patients are responsive, have them cover their eyes.
- The litter patients are usually brought onto the aircraft using the rear cargo door that drops down to form a loading ramp. The standard procedure calls for a load master and a spotter located near the loading ramp. They will signal when they are ready to start the loading process.

- The loading process begins upon the spotter's signal. The patient is carried toward the spotter, using a four-person carry. Upon reaching the spotter, who is usually located approximately 20 feet behind the aircraft, the litter bearers turn and head directly into the back of the aircraft. Just prior to reaching the top of the ramp, the litter bearers must change to a two-person carry because the aisle between the litter racks is too narrow to allow four people to pass. Inside the aircraft, the crew members assist in placing and securing the patient in the appropriate litter racks. Once the patient is securely fastened into the litter racks, the litter bearers exit the aircraft the same way they entered the aircraft, down the back ramp. They proceed to the spotter's position and wait for his directions. The spotter controls the flow of patients to the aircraft and the return of litter bearers from the aircraft. If the spotter signals for the flow of patients to stop, those who are in the prop wash area of the aircraft will proceed to the spotter's position and the others will remain in the holding area at the side of the airfield until further notice.
- The loading process should be smooth and efficient. As soon as one patient leaves the holding area, another should be placed in the entrance and be ready for the spotter's signal to approach the plane. The patient leaves this position only when signaled to do so by the spotter.
- Occasionally the aircraft might be loaded with cargo or configured to load through a front entrance. In this case, a ramp or stairs will usually be installed at the entrance of the aircraft. The DMAT members will follow the instructions of the spotter and other members of the flight crew in the same fashion as loading from the rear of the aircraft.⁷

Basic Safety Rules for Loading Littered Patients

Wear protective clothing, gloves, and eye and hearing protection, as discussed before. Ankle-supporting, non-skid boots are essential, especially when working in a muddy, rain-slicked environment.

- Properly prepare the patient for the loading process.
- Do not rush. Follow the directions of the aircrew. Work as a team to ensure that all members have a firm footing and hold on the litter being carried. This is very important when entering the aircraft on a slanted ramp or stairs, especially on wet surfaces.
- Be aware of your surroundings. Do not venture too close to the prop areas. Remember, when the props are turning, they become invisible and are very dangerous.

- Do not try to lift and carry more than you are physically able. This can harm not only you but also the patients and the others working with you.
- Especially in the prop wash of a hot load and in dark, cold, and rainy weather, eye protection will sometimes fog, greatly reducing your visibility. Take time to correct this problem.
- The aircraft crew is fully trained to handle emergencies. Follow their directions carefully and without hesitation.⁷

CONCLUSION

In response to disasters, DMAT members must be diligent about the hazards and potential problems that might arise while working in and around aircraft. If the DMAT member properly prepares his or her gear for air travel and follows the basic safety rules provided by the airlines, then travel to and from the disaster site will be much safer. At the disaster area, extreme care and caution must be exercised when preparing to transport or receive patients, supplies, and personnel via aircraft. If safety rules are followed and proper preparation is made, then the use of aircraft in disaster response will be an asset rather than a liability.

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